IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

DePuy Mitek, Inc. **a Massachusetts Corporation** **Plaintiff.** **v.** **Arthrex, Inc.** **a Delaware Corporation** **Defendant.**	)))))))))))	**Civil No. 04-12457 PBS**

Plaintiff DePuy Mitek's Memorandum In Support Of Motion To Strike
<u>Hearsay Exhibit And All Citation And Commentary Thereto</u>

Plaintiff DePuy Mitek moves to strike any use by defendants of a brochure entitled "Spectra Extended Chain Polyethylene Fibers" as inadmissible hearsay pursuant to FED. R. EVID. 802. Defendants Arthrex, Inc.'s and Pearsall's Ltd.'s attempt to use the uncorroborated statements contained in that third-party brochure as evidence should also be precluded – in particular, both the brochure itself and the following: (a) Statements Of Fact Nos. 9, 48-49, and 51-53 in Defendants Arthrex, Inc.'s And Pearsall's Ltd.'s Concise Statement Of Material Facts In Support Of Their Motion For Summary Judgment; (b) the material for which the brochure is cited as support on page 1 of Defendants Arthrex, Inc.'s And Pearsall's Ltd.'s Motion For Summary Judgment; and (c) the material for which the brochure is cited as support on pages 1 and 14 of Defendants Arthrex, Inc.'s And Pearsall's Ltd.'s Opening Brief On Claim Construction.

I. The Brochure Is Hearsay And, As Such, Is Facially Inadmissible

At numerous points in both their Motion For Summary Judgment (*see, e.g.*, at p.1), their accompanying Concise Statement Of Material Facts In Support Of Their Motion For Summary Judgment (*see, e.g.*, proposed fact nos. 9, 48-49, and 51-53), and their Opening Brief On Claim Construction (*see, e.g.*, at pp.1 and 14), Defendants Arthrex, Inc. ("Arthrex") and Pearsall, Ltd. ("Pearsall") cite and refer to a brochure entitled "Spectra Extended Chain Polyethylene Fibers" as support for their arguments (Ex. 1). The citations explicitly indicate that Arthrex and Pearsall are attempting to rely upon the brochure to prove the truth of the statements asserted in that brochure. This is classic hearsay as defined in FED. R. EVID. 801(c).

Although the brochure makes a variety of statements, no one was ever deposed who had any knowledge about the brochure, nor was any further discovery taken that might establish or corroborate the veracity of the statements made. Indeed, although it allegedly was created by someone within Allied Signal, even this has not been properly established.

Given its hearsay status, and barring the brochure meeting a specific exception to the hearsay rule, it may not be used either at trial or in during substantive pretrial proceedings like the present summary judgment and claim construction briefings. "Hearsay evidence, inadmissible at trial, cannot be considered on a motion for summary judgment." *Garside v. Osco Drug, Inc.*, 895 F.2d 46, 50 (1st Cir. 1990) (citing cases; affirming district court's granting of summary judgment and finding inadmissible hearsay an interrogatory response describing anticipated expert trial testimony); *see also Morrow v. Wal-Mart Stores, Inc.*, 152 F.3d 559, 563 (7th Cir. 1998) ("hearsay is inadmissible in summary judgment proceedings to the same extent that it is inadmissible at trial").

II. The Brochure Does Not Qualify Under Any Exception To The Hearsay Rule And Is, Thus, Inadmissible And Should Be Stricken

Although the brochure is undisputably hearsay, Arthrex and Pearsall offer nothing that might establish that the brochure falls within any of the possible exceptions to the hearsay rule so as to allow it to be considered as evidence by the Court.

A. The Brochure Cannot Qualify As A Business Record

Fact discovery closed many months ago and Arthrex and Pearsall did nothing to corroborate or otherwise qualify the brochure under one of the hearsay exceptions. Thus, for example, the brochure does ***not*** qualify as a business record since Arthrex and Pearsall have failed to meet the explicit requirements of FED. R. EVID. 803(6) in that there is no evidence that third-party Allied Signal Inc., the company allegedly responsible for the brochure, produced the brochure as part of its regular business activity. Allied Signal Inc. was never deposed nor was any other type of additional discovery about the brochure sought from Allied Signal.

Not surprisingly, the only witnesses ever questioned about the brochure on deposition – witnesses entirely unaffiliated with Allied Signal -- testified that they had never seen the brochure (Ex. 2 at 193:5-16 and Ex. 3 at 314:14-20).

B. The Brochure Cannot Qualify As A Learned Treatise

For similar reasons, the brochure cannot qualify as a learned treatise under FED. R. EVID. 804(18). First, there is no cognizable evidence that the brochure was actually publicly published. Second, given that there is no substantive testimony about the brochure at all, there is no evidence establishing that the brochure is "a reliable authority" as required by the Rule.

III. Conclusion

Because the proffered brochure is inadmissible hearsay, all use of it should be precluded and the brochure itself should be stricken. Each of Defendants' proposed Statements Of Fact Nos. 9, 48-49, and 51-53, the use of the brochure on page 1 of Defendants' Motion For Summary Judgment, and the use of the brochure on pages 1 and 14 of Defendants' Opening Brief On Claim Construction should also be stricken.

Dated: September 1, 2006

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EXHIBIT 1

EXTENDED–CHAIN FIBER

SPECTRA®
EXTENDED CHAIN POLYETHYLENE FIBERS

DePuy Mitek, Inc. v. Arthrex, Inc.
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Allied Fibers

Allied Signal Technologies

SPECTRA®

HIGH PERFORMANCE FIBERS FOR REINFORCED COMPOSITES

Published by
Allied Fibers Technical Center
P.O. Box 31
Petersburg, Virginia 23804
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SPECTRA® EXTENDED CHAIN POLYETHYLENE FIBERS

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1. HISTORY

Extended Chain Polyethylene (ECPE) fibers are the most recent entrants in the high performance fibers field. SPECTRA® ECPE, the first commercially available ECPE fiber, was introduced in February 1985. They are the first in a family of extended chain polymers manufactured by Allied-Signal Corporation.

SPECTRA® ECPE fibers are, pound for pound, the highest modulus and strongest fibers ever made. This is a noteworthy achievement on two counts. First, because industry had relegated it to the status of a general purpose commodity polymer, polyethylene was not considered as a specialized high performance product. Second, the discovery was not made in a large industrial polymer laboratory, but from fundamental work by researchers in several leading universities. Although the work was supported by industry, the immediate outcome was not foreseen as a commercial entity. It is, however, an example of industry recognizing the value of revolutionary findings and exploiting the promise of technology. The result was the transformation of a commodity type polyethylene (PE) plastic into a high performance fiber.

Today, ECPE fibers are being utilized as a reinforcement in areas that, five years ago, were not accessible to any organic fiber. Applications such as ballistic armor, impact shields, and radar domes are being developed to take advantage of the unique properties of ECPE.

2. CHEMISTRY

SPECTRA® fibers are made from ultra-high molecular weight polyethylene (UHMPE). In contrast to aramids, PE is a flexible molecule which normally crystallizes by folding back on itself. As a consequence, P.E. fibers made by conventional technology do not possess outstanding physical properties. ECPE fibers, on the other hand, are manufactured by a process where most of the molecules are fully extended and oriented in the fiber direction, resulting in a dramatic increase in physical properties. A simplistic view of the structure on a molecular scale could be described as a bundle of rods, with occasional entangled points that tie the structure together. Conventional PE, on the other hand, contains a number of chain folds of short length which do not make a contribution to strength.

The key structural parameters that distinguish ECPE fibers from conventional melt spun materials are further illustrated in Figure 1. The molecular weight of UHMPE is generally 1 to 5 million, whereas conventional P.E. fibers are typically 50,000 to several hundred thousand. SPECTRA® fibers also exhibit a very high degree of crystalline orientation (95-99%), and crystalline content (60-85%).

3. MANUFACTURING

Two general routes can be used to achieve high-modulus PE fibers. The first is by extrusion, such as melt extrusion or by solid-state extrusion, utilizing lower molecular weight PE polymer and specialized drawing techniques. These processes lead to a fiber with high modulus, but relatively low strength and high creep. The second route involves solution spinning, where very high molecular weight PE can be utilized. With this process modification, a fiber with both high modulus and high strength is produced.

The solution spinning process for a generalized extended chain fiber begins with a polymer of approximately 1-5 million molecular weight, which is dissolved in a suitable solvent. The solution serves to disentangle the polymer chains-a key step in achieving an extended chain polymer structure. The solution is fairly dilute but viscous enough to be spun using conventional melt spinning equipment. The cooling of the extrudate leads to the formation of a fiber which can be continuously dried to remove solvent or later extracted by an appropriate solvent. The fibers are generally post drawn prior to final packaging.

Unlike most high performance processes, the solution spinning process is unusually flexible, providing an almost infinite number of process and product variations. Fiber strengths from 375 KSI to 560 KSI and tensile moduli of 15 MSI to 30 MSI have been achieved on a research scale by various companies worldwide. As the solution spinning process is modified, a higher tenacity (stronger) and more thermally stable yarn is produced. Circumstantial evidence (such as increased density, heat of fusion and x-ray orientation pattern) suggests that the increased strength and stability are caused by higher degrees of molecular orientation.

4. APPLICATIONS

4.1 Fiber Properties

The comparative strengths of ECPE fibers versus other high performance fibers are summarized in Table 1. SPECTRA® 900, produced by Allied-Signal, will be used to illustrate the general properties of ECPE. SPECTRA® 1000 fibers are more stabilized, and exhibit a higher strength and modulus. In engineering terms, the tensile properties of ECPE are similar to many high performance fibers. However, because of the low density of PE (approximately 2/3 that of high modulus aramid and half that of high modulus carbon fiber), SPECTRA® fibers have extraordinarily high specific strengths and specific moduli. Pound for pound, the strength of SPECTRA® fiber is at least 35% greater than high modulus aramid or S-Glass, and about twice that of conventional high modulus carbon fiber. When comparing high performance fibers, it is often informative to employ a graphical illustration of Table 1. A two-dimensional plot of specific strength versus specific modulus for currently available fibers is given in Figure 2, again emphasizing the superior properties of SPECTRA®.

Polyethylene is also known as a system where traditional binders and wetting agents have proven to be ineffective in improving adhesion levels. ECPE fibers have shown that this characteristic is actually advantageous in specific areas. For instance, ballistic performance is inversely related to the degree of adhesion between the fiber and the resin matrix. For applications which need higher levels of adhesion and wetout, extensive research has been performed on SPECTRA® fibers. It has been found that by submitting the fiber to specific surface treatments, such as corona discharge or plasma treatments, the adhesion of the fiber to various resins is dramatically increased (see Table 2).

The main application areas being explored and commercialized today for SPECTRA® fibers are divided into two main thrusts: traditional fiber applications such as sailcloth, marine ropes, cables, sewing thread, nettings, and protective clothing; and high tech composite applications, such as ballistics, impact shields, medical implants, radomes, pressure vessels, boat hulls, sports equipment, and concrete reinforcement.

4.2 Sailcloth

World class competition of high performance sail boats (such as the Americas Cup) has become more competitive, forcing the sail industry to experiment with new materials. A winning sailcloth must possess high strength, high modulus, light weight and minimal distortion during the sailing season. Of the fiber physical properties, none are more critical than low creep and resistance to sea water and cleaning agents. Because of its superior strength-to-weight ratio and low creep response, SPECTRA® 1000 fibers are ideally suited for high performance yachting sails. Further, PE fibers are resistant to sea water and to typical cleaning solutions used in the boating industry, such as clorox (see Figure 3).

The creep behavior of SPECTRA® extended-chain fibers under typical laboratory test loadings of 3-4 gram/denier is illustrated in Figure 4. These creep levels are substantially below those encountered with conventional PE or the specialized high modulus fibers from melt spinning. At this loading, which includes the initial elastic loading component, the creep level of SPECTRA® 1000 is comparable to that of a high modulus aramid. The elastic load component is included in these results on a practical basis since it is an integral part of the sail cloth design.

4.3 Marine Ropes

High strength, light weight, low moisture absorption and excellent abrasion resistance all make ECPE a natural candidate for marine rope. Three parameters of SPECTRA® 900 rope (diameter, weight per length, and strength) are illustrated in Table 3. Since aramid fibers are the accepted standard in the high performance rope industry, aramids will be used here to provide a yardstick by which the ECPE fibers can be measured. SPECTRA® 900 braid is 12% smaller, 10% stronger and 52% lighter than the aramid product.

The important considerations in marine rope applications are load, cycling and abrasion resistance. The response of a SPECTRA® 900 rope to load cycling was measured by testing on a sheave device. The rope was repeatedly loaded to 4000 lb until it broke. In this type of test, a 12 strand ECPE braid withstood approximately eight times the number of cycles that led to failure in the control 12 strand aramid braid (Table 4). Abrasion resistance was measured by cycling the rope over an oscillating bar. In this test, 0.5 inch diameter ECPE braided rope withstood eight times the abuse of a similar aramid rope (Table 4).

4.4 Cut Resistant Gloves And Protective Clothing

The specially toughened and dimensionally stabilized SPECTRA® 1000 yarn has made a revolutionary new line of cut-resistant products. This technology offers a previously unattainable level of protection from cut and abrasion without sacrificing comfort and launderability. Spectra® fibers are being used in the form of cut resistant gloves, arm guards and chaps. Specific industries involved include: meat packing, commercial fishing, poultry processing, sheet metal work, glass cutting, and power tool use. The inert chemical nature combines with cut protection for non-permeable over-gloves in surgical, dental, laboratory testing, and police emergency response applications.

4.5 Ballistic Protection

ECPE's high strength and modulus and low specific gravity offer higher ballistic protection at a lower areal density than is possible with currently used materials. It can be used in flexible and rigid armor.

Flexible armor is manufactured by joining multiple layers of fabric into the desired shape. The style of the fabric and number of layers will determine the

ballistic resistance that the armor will provide. Typical V50 ballistic limits of plain weave SPECTRA® fabrics of different denier yarns are plotted as functions of areal density in Figure 5. Applications include protective vests for military personnel and civilian security forces as well as ballistic blankets. These blankets can be applied to ceramic and metallic armor as a front spall shield and as a rear spall suppressor. They can also be used to fabricate ballistic protective shelters.

Traditional rigid armor can also be made by utilizing woven ECPE fiber in either thermoset or thermoplastic matrices. These rigid systems exhibit high ballistic protection due to the fiber strength and modulus in combination with its low specific gravity; that is, maximum ballistic protection is achieved with minimum weight. This increased protection is illustrated in Figure 6, which compares V50 values for SPECTRA® fiber and aramid composites against a 22 caliber fragment simulator.

The ECPE fiber ballistic systems can be contoured or formed into armored plates, helicopter seats, Army or police helmets, and many other product forms. It is important for these systems to maintain their ballistic protection under a wide range of environmental conditions. For example, Figure 7 illustrates the superior performance of SPECTRA® fiber armor, even at temperatures as high as 225°F. This performance, along with the low moisture absorption, chemical inertness, and low weight characteristics make ECPE fibers a natural in the ballistic area.

4.6 Composites

ECPE fibers are recent entrants into the high performance composite industry. Their high strength and high modulus were the main attributes which attracted the composite industry, leading to the investigation of potential applications.

SPECTRA® fibers have been used with a wide variety of resin systems, including: epoxies, polyesters, vinylesters, silicones, urethanes and polyethylene. The choice of resin is most often dictated by the end use application and requirements. Epoxy and IPN resins provide the highest mechanical properties currently reported; epoxies being used most often by the composites industry, and IPNs gaining importance in RIM/RTM processes. Vinylester and urethanes, on the other hand, offer the greatest impact and ballistic properties at the expense of mechanical strength. Polyester is intermediate to the two groups, and is most often used in the radome industry for its electrical properties. ECPE fibers can be processed essentially the same as aramid, graphite, and glass. Hand layup, matched mold, pressure, and vacuum molding of fabric prepregs are most often used; however, filament winding and pultrusion are also common with continuous filament.

SPECTRA® fibers can be found in various forms; roving, fabric, continuous mat, and even chopped fiber. Composite applications where high strength (i.e. tensile, flexural, or short beam shear) are needed require special fiber treatments to enhance the fiber to matrix adhesion. Allied-Signal, Inc. has developed proprietary treatments for their SPECTRA® fibers to increase the adhesion level and composite properties.

4.6.1 Composite Applications

SPECTRA® fiber reinforced materials are being developed and used widely in ballistics, radar protective domes, aerospace, sport equipment, and industrial applications. Some of these areas utilize the fiber in hybrid form, i.e. in combination with S-2 Glass, Graphite, Aramid, and/or Quartz.

Ballistics are so far the dominant market segment. Components include helmets, helicopter seats, automotive and aircraft armor, bullet proof radomes, and other industrial structures.

Radar protective domes (radomes) is another market utilizing ECPE fibers. Because of the excellent electrical properties of polyethylene, SPECTRA® composite systems act as a shield that is virtually transparent to microwave signals, even in high frequency regions. Hybridization with quartz or glass fiber are also attractive from the structural, cost, and performance point of view.

The major sport equipment applications to date have been canoes, kayaks, snow and water skis. Numerous other sport applications are under development, including: bicycles, golf clubs, ski poles, and tennis rackets. Further growth is expected in formula race car bodies.

The industrial market is taking advantage of SPECTRA® fibers in areas where increased strength, impact resistance, non-catastrophic failure, lightweight, or corrosion resistance are required. The corrosion resistance has led the composite industry to investigate applications where parts are exposed to a wide variety of chemical elements. Until now, standard high performance fibers could not function under such adverse conditions.

5. PROPERTIES OF COMPOSITES

The various fiber characteristics discussed so far can be translated into several unique composite properties. The following discussion will be organized into the following categories:

1. Ballistic
2. Impact
3. Electrical
4. Structural

5.1 Ballistic Performance

The ballistic performance of SPECTRA® fabrics has been presented as a function of areal density and fiber denier in the ballistic protection section. The excellent protection of SPECTRA® fabrics can be translated into hard armor composites. For example, ballistic protection against .22, .30, and .50 caliber threats is summarized in Figure 8. Looking back to Figure 6, one can see the advantage of SPECTRA® composites over similar composites reinforced with aramid fibers for fragmentation protection.

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Handgun projectiles present a different type of threat, and again, SPECTRA® composites face up to the challenge with reduced weight and increased protection over aramid composites. The resistance to handgun ammunition of SPECTRA® and aramid composites are compared in Table 5. In every case, the SPECTRA® composites demonstrate lower areal density and/or increased protection.

5.2 Impact Resistance

Energy dissipation is one of the most outstanding features of ECPE. For instance, a comparison of fabric composites of SPECTRA®, Glass, Kevlar and Graphite under impact conditions is presented in Table 6. The SPECTRA® composite panels had significantly better impact properties, and were not "through penetrated" as the other panels were. Another unique behavior of SPECTRA® composites under impact loading is highlighted by repetitive impact studies. Figure 9 presents repetitive impact data for a similar SPECTRA® composite panel. Toughness gradually increases after each successive impact, working to extend the actual part life.

Drop weight instrumented impact tests were also performed on honeycomb sandwich composites. Again, the peak forces resisted by the SPECTRA® plates were consistently higher than similar aramid plates (Table 7). The peak impact force, total impact energy, and energy absorbed to peak force increase with the increase in face sheet thickness, from 1 to 3 plies. Resistance to hailstorm erosion is a practical example of the advantages that can be gained from the tremendous impact resistance offered by SPECTRA® honeycomb sandwich composites. A comparison with other reinforcements in a simulated hailstorm test is shown in Figure 10.

With the new surface treatments developed to enhance the fiber-resin interface adhesion, direct effects on the impact performance can be seen in Table 6. It should be noted that although the impact properties have decreased, the impact resistance of treated SPECTRA® composites is still five times that of glass or aramid, with a significant increase in physical properties.

5.3 Electrical Properties

Radar protective covers (radomes) are gaining an increasingly important role in today's radar systems. The most important attribute for a radome to possess is to be as close to "invisible" or "transparent" to the signal as possible. Because of the low dielectric constant and loss tangent of polyethylene, (see Table 8) SPECTRA® fiber composite systems can fulfill this requirement better than any other high performance fiber. The SPECTRA® composite low dielectric constant (2.3-2.5) has been shown to hold in the high frequency ranges, even up to the millimetric band. The superior electrical properties of ECPE fibers can be utilized in single fiber systems, or can be used to improve the properties of glass radomes via hybridization. A dielectric constant of 2.9 has been obtained with a SPECTRA®/Glass (25/75) hybrid system.

The advantages of low dielectric and low loss UHSPE fibers in radar systems can be demonstrated by observing the effect of the radome on the transmission ratio. The transmitted signal of a typical SPECTRA® radome matrix is compared with a glass radome at various ratios of wall thickness to wavelength in Figure 11. The SPECTRA® radome causes much less distortion of the signal. This advantage is even more pronounced in Type A honeycomb sandwich panels (Figure 12). By causing less signal reflection and absorbence, SPECTRA® fiber composite systems are uniquely suited to radome applications.

Other possible electrical applications for ECPE fibers and their reinforced composites are electrical shelters, x-ray tables, optical cables, and other structures where high strength non-conductive characteristics are needed.

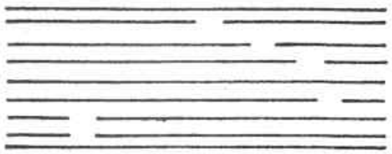
5.4 Structural Properties

Static test results for SPECTRA® 900 and SPECTRA® 1000 unidirectional composites are summarized in Table 9. All test samples were cut from unidirectional prepregs of corona treated ECPE fiber with Shell Epon 825 epoxy resin and Mellamine 5260 cycloaliphatic diamine curing agent. The strength and modulus of SPECTRA® 1000 are higher than the SPECTRA® 900 composites, due to the improved strength of the SPECTRA® 1000 fiber. Further improvements in composite properties can be achieved by applying the plasma surface treatment to the fibers. This treatment increases the interfacial bonding, which translates into even higher composite structural properties, as described previously in Table 2.

The continuing research in improving the ECPE fiber-matrix compatibility along with hybridization with other high performance fibers open a wide new area in composite properties. These developments are currently being explored by scientists at Allied-Signal.

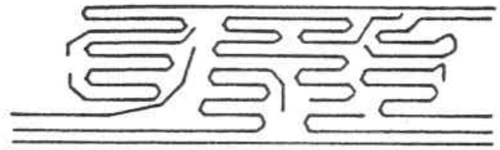
Figure 1. *Fiber Morphology.*

Extended-chain fiber



- Very high molecular weight
- Very high degree of orientation
- Minimum chain folding

Conventional fiber



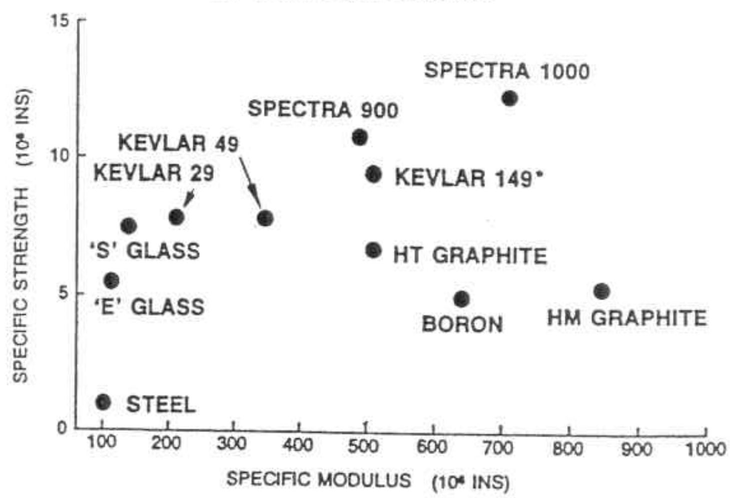
- Relatively low molecular weight
- Moderate orientation
- Crystalline regions chain folded

TABLE 1
HIGH PERFORMANCE FIBER PROPERTIES

	UHSPE SPECTRA 1000	ARAMID HM	ARAMID UHM*	S-Glass	Graphite HM
Property					
Density	0.97	1.44	1.47	2.49	1.86
Elongation, %	2.7	2.5	1.5	5.4	0.6
Tensile Strength, 10^3 psi	435	400	500	665	375
Specific Strength, 10^6 in	12.4	7.8	9.5	7.4	5.4
Tensile Modulus, 10^6 psi	25	19	25	13	57
Specific Modulus, 10^6 in	714	365	480	140	850

* Kevlar 149 — Epoxy Impregnated Strand

Figure 2. *Comparative tensile properties of various reinforcing fibers.*



* RESIN IMPREGNATED FIBER TESTED

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TABLE 2
UHSPE FIBER ADHESION IMPROVEMENTS

Fiber: SPECTRA® 900

Resin: Epoxy

Fiber Loading: 60%

		Unidirectional			Fabric (Style 903)		
Date	Treatment	SBS (KSI)	Flex Str (KSI)	Flex Mod (MSI)	SBS (KSI)	Flex Str (KSI)	Flex Mod (MSI)
10/85*	TN[1]	1.16	21.2	1.2	0.87	5.7	0.44
10/86	CT[2]	2.61	27.6	2.6	1.4	10.3	1.0
10/87	TP[3]	4.50	33.9	4.5	2.2	21.0	2.9

* Market Introduction [1] No Treatment [2] Corona Treatment [3] Plasma Treatment

Figure 3. *Chemical resistance.*

Agent	% Strength Retention After 6 Months Immersion SPECTRA 900	Aramid
Sea Water	100	100
10% Detergent solution	100	100
Hydraulic fluid	100	100
Kerosene	100	100
Gasoline	100	93
Toluene	100	72
Perchlorethylene	100	75
Glacial acetic acid	100	82
1M Hydrochloric acid	100	40
5M Sodium hydroxide	100	42
Ammonium hydroxide (29%)	100	70
Hypophosphite solution (10%)	100	79
Clorox®	91	0

Immersed in various chemical substances for a period of 6 months, SPECTRA fibers retained their original strength.

Figure 4. *Creep at 10% load (room temperature).*

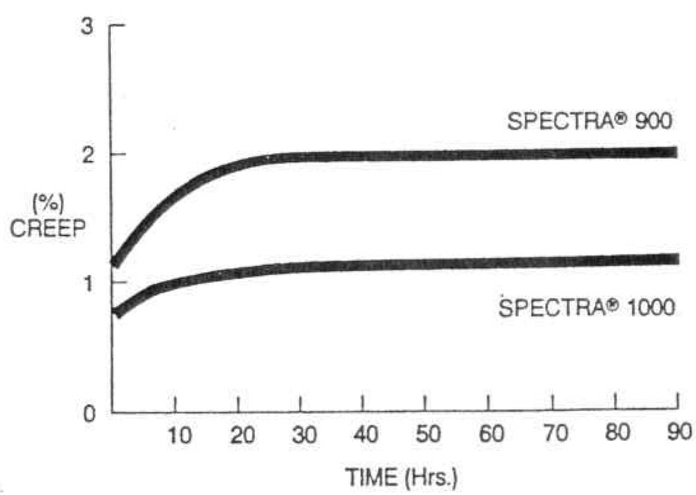

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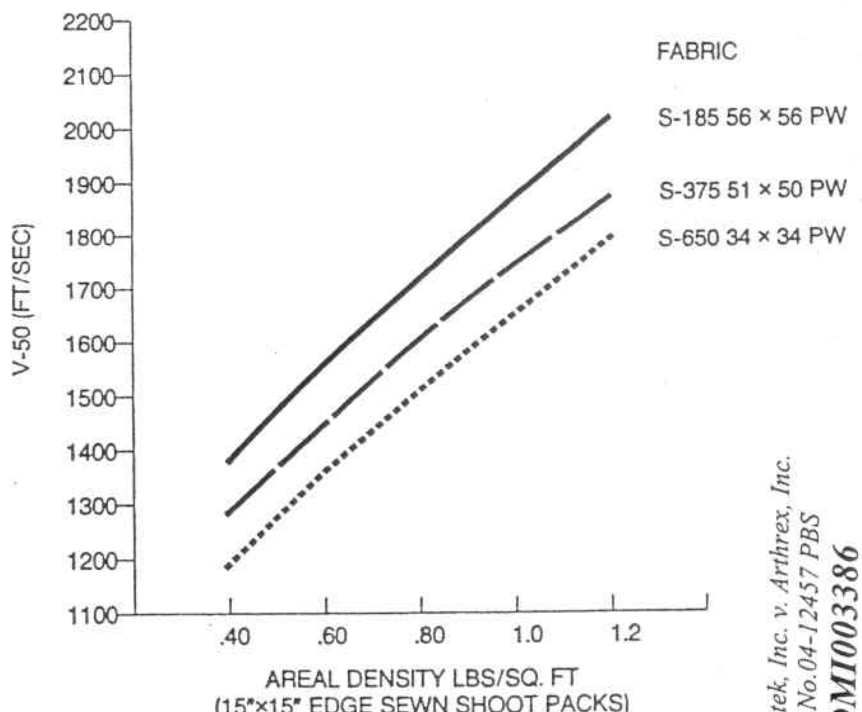
TABLE 3
COMPARATIVE PROPERTIES OF 16-STRAND ROPE

Property	SPECTRA® 900	Aramid
Diameter (In)	0.088	0.10
Wt/100 Ft (Lb)	0.153	0.32
Tensile Strength (Lb)	1465	1334

TABLE 4
CYCLE LOADING AND WEAR TESTS

	SPECTRA® 900	Aramid
Cyclic Sheave – 12 Strand Braid (10 Cycles/Min, 4000 Lb Tensile Load) Cycles to Break	10,231	1212
Oscillating Bar – 0.5 In. Rope (1.5 Cycles/Min, 1700 Lb Tensile Load) Cycles to Break	883	111

Figure 5. *Ballistic performance of SPECTRA® fabrics.*



.22 CAL. 17 GR FSP

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Figure 6. *Ballistic performance of Spectra® and Aramid composites.*

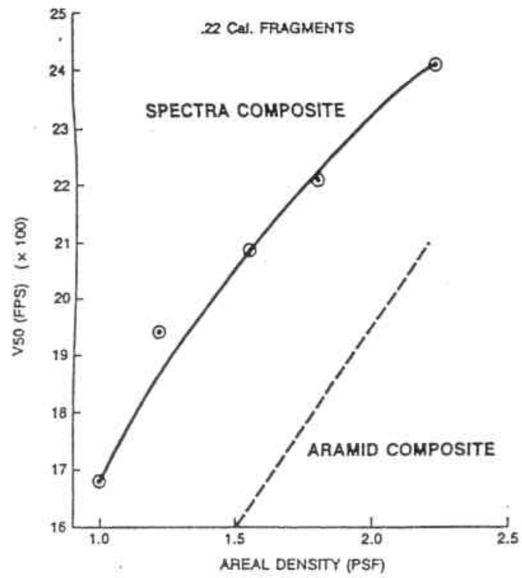

Figure 7. *Spectra® fabric ballistic performance at elevated temperatures.*

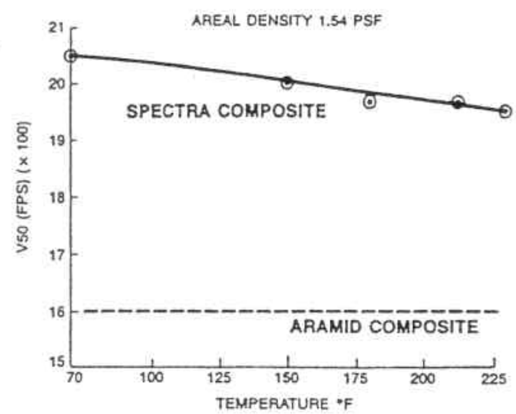

Figure 8. *Spectra® composite ballistic protection versus .22, .30 & .50 caliber fragments.*

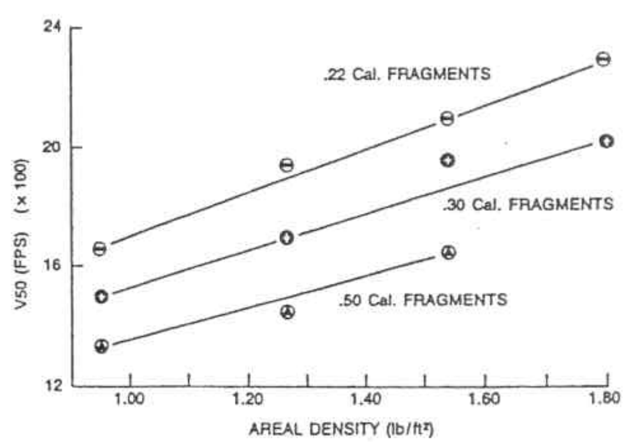

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TABLE 5
RESISTANCE TO HANDGUN AMMUNITION OF SPECTRA® AND ARAMID COMPOSITES

Ammunition	No.	Armor System	AD (PSF)	V50 (FPS)
.357 Cal. 158 grain JSP	1	Spectra/Vinylester 411-45	0.62	1220
	2	Spectra/Vinylester 411-45	1.12	1443
	3	Kevlar/Polyester	1.15	1281
	4	Spectra/Vinylester 411-45	1.36	1481
	5	Kevlar/Polyester	1.49	1311
9mm 124 grain FMJ	6	Spectra/Vinylester 411-45	0.62	1082
	7	Spectra/Latex	0.70	1200
	8	Spectra/Vinylester 411-45	0.83	1173
	9	Spectra/Latex	1.01	1454
	10	Spectra/Latex	1.23	1594
	11	Kevlar/Polyester	1.28	1241
	12	Kevlar/Polyester	1.46	1372
	13	Spectra/Latex	1.53	1624

Products: Spectra 1000 and Kevlar 29

TABLE 6
INSTRUMENTED IMPACT OF FABRIC COMPOSITES

Resin: Epoxy Resin

Fiber Vol. Loading: 60%

Fiber	Treatment	Max Load (Lb)	Energy At Max Load (Ft-Lb)	Total Energy (Ft-Lb)	Observation
SPECTRA 900	TN[1]	1660	47.4	54.5	No Penetration
SPECTRA 900	TP[2]	1030	12.0	28.0	Penetration
Kevlar 49	EC[3]	254	1.3	6.7	Penetration
S-2 Glass	EC	370	1.8	4.4	Penetration
HM Graphite	EC	133	1.2	2.5	Penetration

[1] No Treatment [2] Plasma Treatment [3] Epoxy Compatible

Figure 9. *Repetative impact of Spectra® composites.*

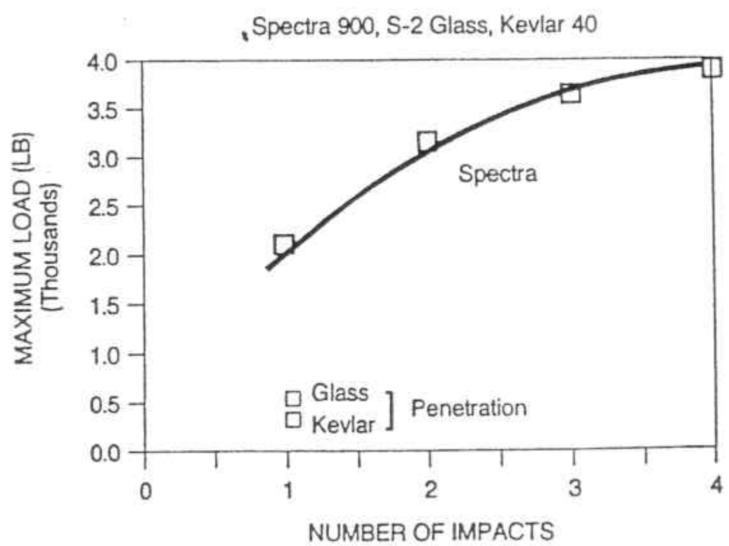

TABLE 7
IMPACT ABSORPTION OF SANDWICH COMPOSITES

Core: ½ in. honeycomb (3 lb./cu. ft.)
Resin: Epoxy (Epon 826)

Skin	No. of Layers	Energy to Peak Force (ft. lb.)	Total Energy Absorbed (ft. lb.)
SPECTRA 900	1	22.4	61.5
Aramid	1	0.7	2.3
SPECTRA 900	3	33.5	59.8
Aramid	3	1.5	10.5

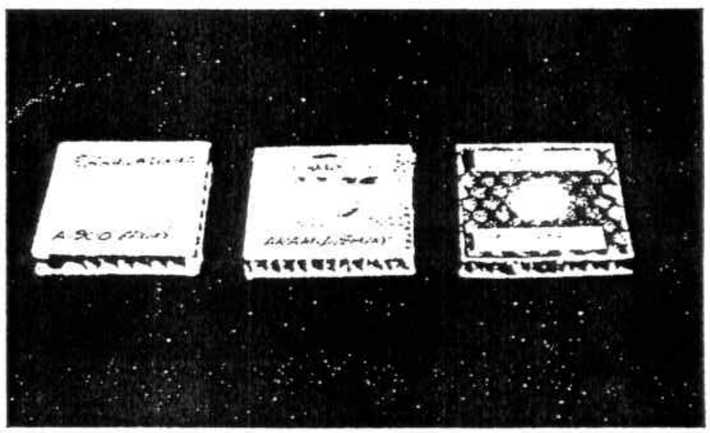

Figure 10. *Hailstorm test on Type A composite sandwich panels courtesy of Norton Company, Ravenna, OH.*

TABLE 8
FIBER ELECTRICAL PROPERTIES

Material	Dielectric Constant	Loss Tangent
SPECTRA	2.0-2.3	0.0002-0.0004
E-Glass	4.5-6.0	0.0060
Aramid	3.85	0.0100
Quartz	3.78	0.0001-0.0002

Figure 11. *Transmission versus relative thickness for flat panels at 8.5 GHZ.*

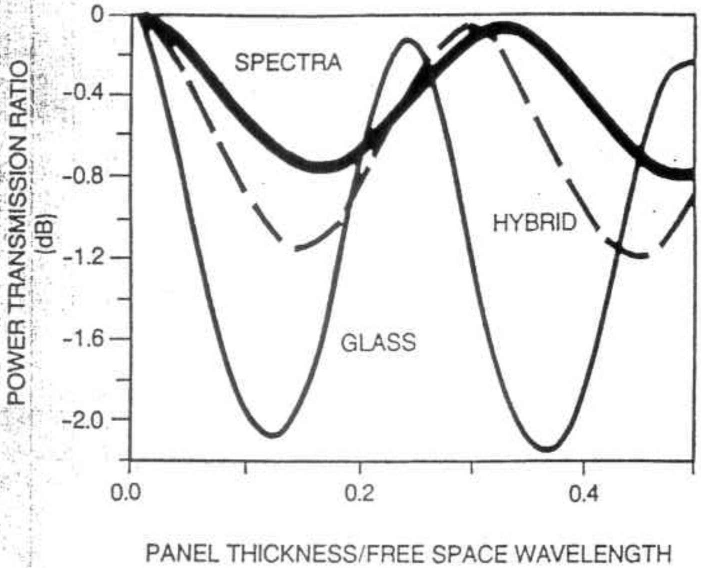

Figure 12. *Transmission versus relative thickness Type A, sandwich radome test panel at 8.5 GHZ.*

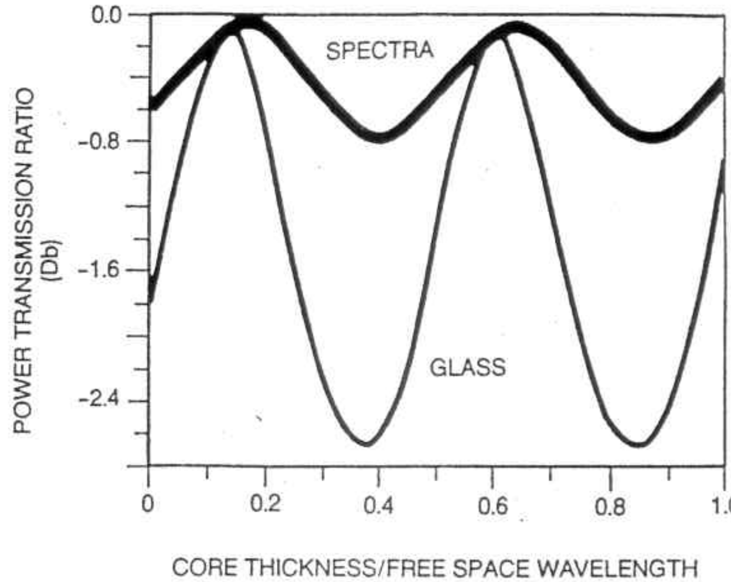

TABLE 9
PROPERTIES OF UNIDIRECTIONAL COMPOSITES (NON TREATED FIBER)

	Spectra® 900	Spectra® 1000
Axial tensile strength (10^3 psi)	174	217
Axial tensile modulus (10^6 psi)	5.8	9.1
Axial strain to failure (%)	3.8	2.6
Major Poisson's Ratio	0.32	0.28
Transverse tensile strength (10^3 psi)	1.4	1.5
Transverse tensile modulus (10^6 psi)	0.6	0.2
Axial compressive strength (10^3 psi)	15.8	16.0
Axial compressive modulus (10^6 psi)	—	3.6
Short beam shear strength (10^3 psi)	4.0	2.5

EXHIBIT 2

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS
C.A. No. 04-12457 PBS

* * * * * * * * * * * * *

DePUY MITEK, INC., *
Plaintiff *
v. *
ARTHREX, INC., a Delaware *
corporation, *
Defendant *

* * * * * * * * * * * * * *

VOLUME I
PAGES 1-245

DEPOSITION OF DePUY MITEK, INC. by SHELBY COOK KORNBLUTH, a witness called on behalf of the Defendant, pursuant to the Federal Rules of Civil Procedure, before Jessica L. Williamson, Registered Merit Reporter, Certified Realtime Reporter and Notary Public in and for the Commonwealth of Massachusetts, at the Hilton Hotel, 25 Allied Drive, Dedham, Massachusetts, on Tuesday, November 15, 2005, commencing at 9:01 a.m.

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A. Based on strength retention and absorption profiles of PDS, as well as tissue response.
Q. What was the purpose of having the PDS material in the suture? You said -- you testified the ultra high molecular weight PE was for strength?
A. Yes.
Q. What was the PDS for?
A. To -- it's a bulking agent.
Q. Excuse me?
A. It's like a bulking agent. The suture is strong enough on its own with just polyethylene; however, it doesn't have very good handling properties, so it doesn't have a good structure, it doesn't have good handling properties, it doesn't have good knot characteristics, so you add another material as a bulking agent to improve those properties.
Q. To improve the handleability properties?
A. Yes.
Q. So the PDS was introduced to improve the handleability properties of the --
A. Yes.
Q. -- of the suture?

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A. Of the polyethylene.
Q. Well, of the suture as a whole or just of the ultra high molecular weight PE? It was to make the suture more handleable, correct?
A. Yes. I don't know if I understand the question. I shouldn't have said yes to that.
Q. Sure. And I don't want to put words into your mouth. I'm just trying to understand. The concern was to make the end result suture more handleable; is that correct?
A. Yes.
Q. And the PDS was added as a second component to make the resulting suture more handleable?
A. Yes.
Q. That's what I thought. Thanks.
MR. SABER: Could you mark this as the next exhibit number.
(Exhibit No. 19, Document bearing Production Nos. DMI038149 - 038153, marked for identification.)
Q. Let me show you what's been marked as Defendant's Exhibit 19, and are you familiar with this product -- this document?

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A. Vaguely.
Q. Okay. What is it, do you know?
A. It is a development plan for corporate product characterization for Orthocord suture.
Q. And did you have any involvement in this document?
A. Minimal.
Q. Okay. This was one of the documents that goes into the design history file?
A. This is a document that is required by Ethicon, but is not required by Mitek.
Q. Okay.
A. Ethicon creates this document to have an understanding of what they're going to do before they do it. And I just want to clarify that.
Q. Sure.
A. And the reason I'm vaguely familiar with this is because this was developed while I was out and was issued right around the time that I got back.
Q. Okay.
A. So...
Q. But is this part --

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A. But I understand the document.
Q. Right. And was this document part of the development project of Orthocord?
A. Yes.
MR. SABER: This is Exhibit 20.
(Exhibit No. 20, Document bearing Production Nos. DMI003378 - 003390, marked for identification.)
(Discussion off the record.)
Q. Let me show you what's been marked as Defendant's Exhibit 20, and ask if you're familiar with that.
A. Can you please expand that?
Q. Yeah. Are you familiar with Defendant's Exhibit 20?
A. I have not seen this before, no.
Q. Do you know who -- does SPECTRA mean anything to you?
A. Yes.
Q. What is SPECTRA?
A. SPECTRA is an ultra high molecular weight polyethylene fiber that is manufactured by Honeywell, or AlliedSignal now.
Q. Could you look at the page that says DMI003380.

EXHIBIT 3

UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

C.A. NO. 04-12457 PBS

____x

DePUY-MITEK, INC.,

A Massachusetts Corporation,

Plaintiff,

vs.

READ & SIGN COPY

ARTHREX, INC.,

A Delaware Corporation,

Defendants.

____x

DAY 2 OF 2

CONTINUED VIDEOTAPED DEPOSITION

OF DR. MATTHEW HERMES

Philadelphia, Pennsylvania

July 25, 2006

Reported by:

PAMELA HARRISON, RMR, CRR, CSR

that's likely the case because there's more 12:22:58p
than one carrier of PTFE. And in the claim 12:23:00p
section A, the discussion is of yarns in that 12:23:05p
sentence. 12:23:11p
BY MR. SABER: 12:23:12p
Q. Would you agree with me that item A in 12:23:12p
Claim 1 where it identifies the first set of -- 12:23:17p
first fiber-forming material identifies seven 12:23:22p
different materials? 12:23:25p
MR. BONELLA: Object to form. 12:23:29p
THE WITNESS: No. I would agree 12:23:32p
that section A identifies seven different 12:23:34p
families of materials. 12:23:37p
BY MR. SABER: 12:23:39p
Q. Seven families of materials? 12:23:39p
A. Yes. 12:23:44p
Q. Which are described in Column 4, the 12:23:45p
paragraph starting with Lines 9 and going through 12:23:48p
Line 31, as the lubricating yarns? 12:23:50p
MR. BONELLA: Object to form. 12:23:53p
THE WITNESS: Yes. 12:24:01p
MR. SABER: We've been going for 12:24:29p
a while, Mike. 12:24:31p
MR. BONELLA: Yeah. 12:24:32p
MR. SABER: Why don't we take a 12:24:32p

little break. 12:24:33p
MR. BONELLA: Okay. 12:24:34p
THE VIDEOGRAPHER: Going off the 12:24:35p
record; the time on the video monitor is 12:23 12:24:36p
P.M. 12:24:40p
(A recess was had from 12:23 12:24:45p
P.M. to 12:36 P.M.; and then the proceedings 12:24:45p
continued as follows:) 12:24:45p
THE VIDEOGRAPHER: Going back on 12:36:53p
the record. The time on the video monitor is 12:36:55p
12:36 P.M. 12:36:58p
Please continue. 12:37:00p
BY MR. SABER: 12:37:03p
Q. Dr. Hermes, let me hand you what has 12:37:03p
been previously marked as Defendant's Exhibit-20. 12:37:06p
MR. BONELLA: Thank you. 12:37:13p
BY MR. SABER: 12:37:14p
Q. Have you ever seen this document 12:37:14p
before, sir? 12:37:21p
A. I don't believe so. 12:37:29p
Q. Are you familiar with the product 12:37:30p
Spectra? 12:37:35p
A. To some extent, Mr. Saber, yes. 12:37:42p
Q. Is it your understanding that Spectra 12:37:44p
is a fiber made of ultra high molecular weight 12:37:47p

polyethylene? 12:37:52p
MR. BONELLA: Object to form. 12:37:53p
THE WITNESS: Yes, that is my 12:37:53p
understanding. 12:37:54p
BY MR. SABER: 12:37:55p
Q. Now, could you see in the -- why don't 12:37:55p
you -- well, never mind. 12:38:08p
Do you see there's a reference 12:38:11p
near the end of the second paragraph, on the 12:38:21p
first -- it's the third page of the exhibit, the 12:38:26p
first page of text, near the end of the second 12:38:29p
paragraph there is a reference to the term 12:38:35p
commodity-type polyethylene (PE)? 12:38:41p
A. I do see that, yes. 12:38:48p
Q. Do you have -- have you ever heard the 12:38:50p
term commodity-type polyethylene? 12:38:52p
A. Oh, I'm sure I have. I don't -- I 12:38:55p
can't recall in what context. 12:38:57p
Q. Do you have an understanding of what 12:39:05p
commodity-type polyethylene is? 12:39:07p
A. No, I don't. You know, this is a -- 12:39:11p
this is an advertising brochure by Allied Fibers, 12:39:15p
Allied Signal, and I'm sure they have a meaning 12:39:20p
in their own mind and are trying to make a point, 12:39:22p
but I don't know what the point is, sir. 12:39:25p

Q. Well, if you could read the first two 12:39:27p
parts here, the history and chemistry, I want to 12:39:30p
ask you a few questions about -- 12:39:33p
A. Okay. 12:39:34p
Q. -- whether you agree or disagree with 12:39:34p
what's here. 12:39:37p
A. I notice that the title of this 12:39:38p
brochure is The Extended Chain of Polyethylene 12:39:40p
Fibers, so I assume we're talking about 12:39:42p
polyethylene. 12:39:46p
Q. Well, we're talking -- we'll be 12:39:46p
talking about this exhibit a little bit. 12:39:47p
A. Yeah, but we're -- it's an exhibit 12:39:48p
that's entitled polyethylene, so whatever we're 12:39:51p
talking about must be in the set of polyethylene. 12:39:52p
Q. If you could read the history and the 12:39:55p
chemistry, and I just want to ask you whether you 12:39:56p
agree or disagree with some of the things that 12:40:00p
are stated here. 12:40:03p
A. (Witness reviewing document.) Okay. 12:40:52p
Q. Do you see they use -- Allied Signal 12:40:53p
uses the term conventional polyethylene to 12:40:57p
compare it to the Spectra product? 12:41:00p
A. I see that they use that term, yes. 12:41:03p
Q. Do you have an understanding of what 12:41:05p